REMARKS/ARGUMENTS

Claims 2-5, 8-15, 17, 29-32, 37-44, 46-63 have been currently amended. Claims 16, 18, 19 were previously amended. Claims 1, 20-28, 33, 35-36 were previously canceled. Claims 6, 7, 45 have been also canceled. Claims 34, and 64 were withdrawn.
New claims 65-71 have been added.

The above claim amendments are fully supported by the original specification as filed, and do not contain any new matter.

Independent claim 37 has been amended to specify a method of cleaning (i.e., processing) a substrate having contaminant particles on its surface by first forming a solid sacrificial film on its surface and then transferring energy to physically remove the solid sacrificial film and thereby remove the contaminant particles from the surface.

Independent claim 29 has been amended to specify a method for removing contaminant particles from a surface of a wafer including transferring the wafer among a plurality of processing stations under computer control, identifying and characterizing the contaminant particles on the wafer surface and creating a record of the contaminant particles data, forming a film of a sacrificial material on the wafer surface and finally removing the sacrificial film and the contaminant particles by shining light at the contaminant particles based on the previously collected contaminant particles data.

New independent claim 65 discloses a method for removing contaminant particles from a wafer surface including transferring the wafer among a plurality of processing stations under computer control, identifying and characterizing the contaminant particles on the wafer surface and creating a record of the contaminant particles data, and finally cleaning the wafer surface by shining light at the contaminant particles based on the previously collected contaminant particles data.

Dependent claims 12, 15, 17 and 43 were amended to overcome the Examiner's 35 USC 112 rejections. The remaining dependent claims were amended to comply with the amendment language of the corresponding independent claims.

The Examiner rejected independent claim 29 under 35 U.S.C. 102 (b) as being anticipated by H.K. Park et al., (A practical Excimer Laser-Based Cleaning Tool for Removal of Surface Contaminants). H.K. Park et al. describes a "steam cleaning" process of applying a thin liquid film (i.e., water) on the substrate surface and then irradiating the substrate surface in order to induce explosive vaporization of the liquid and thereby remove surface contaminants (page 631, Abstract). The thin liquid film is "an 8% isopropanol and 92% water mixture" (page 635, D. Liquid Film deposition system). Furthermore "Coating of the liquid film on the solid surface is achieved through condensation of saturated vapor onto the relatively cold sample surface. Therefore it is necessary to heat the working liquid a couple of tens of degrees C above the room temperature" (page 635, D. Liquid Film deposition system). H.K. Park does not disclose a process of purposely forming a solid film of sacrificial material on the substrate surface and then removing the solid sacrificial film by shining light on the film. The solid sacrificial film of this invention comprises collodion, or nitrocellulose, or pyroxylin among others. The solid sacrificial film is formed by spinning or spaying a solution of the above mentioned chemicals with a solvent on the surface substrate and then drying the solvent in the solution in order to form the solid sacrificial film.

H.K. Park further describes a "dry cleaning" process where UV irradiation also causes ablative photodecomposition of organic film contaminants and particulate contaminants on the surface. Examples of these organic film contaminants and particulate contaminants include epoxy and 1micrometer-sized alumina particles, respectively (page 638, C. Cleaning Strategy). Again, H.K. Park does not disclose a process of purposely forming a solid film of sacrificial material (i.e., collodion, nitrocellulose, or pyroxylin) on the substrate surface and then removing the solid sacrificial film by shining light on the film and thereby removing particulate contaminants.

Furthermore, H.K. Park does not disclose a method of first identifying and characterizing contaminant on the substrate surface and creating a record of the contaminant particles data, then forming a solid sacrificial film on the substrate surface, and finally removing the solid sacrificial film by selectively shining light at the contaminant particles based on the record of the contaminant particles data.

The formation of a solid film as opposed to a liquid film, the difference in the chemical composition of the solid film of this invention from the chemical composition of the liquid film of the H.K. Park et al., and the process of first identifying and characterizing contaminant on the substrate surface and creating a record of the contaminant particles data, and finally cleaning the surface based on this record of contaminant particles data differentiate the present invention from the process described by H.K. Park et al.. Therefore, this rejection is overcome since it is believed that claim 29 as amended patentably distinguishes from the H.K. Park et al., process and should be allowed. Claims 30-32 depend upon 29 and should also be allowed.

The Examiner rejected independent claim 37 under 35 U.S.C. 102 (e) as being anticipated by Elliot et al., (US Patent No. 5,669,979). Elliot et al., does not teach a method of processing a substrate including providing a substrate 12 and purposely forming a solid sacrificial film on its surface. Layer 10 shown in FIG. 1 of US Patent No. 5,669,979 is not a solid sacrificial film purposely formed on the substrate surface 11 in order to later remove it and thereby to remove contaminant particles from the substrate surface, as described in claim 37. Layer 10 is the foreign (contaminant) material itself that needs to be removed from surface 11 of substrate 12 by direct laser ablation (column 5, lines 50-65). The lack of the solid sacrificial film formation step differentiates the invention of claim 37 from US Patent No. 5,669,979. Therefore this rejection is overcome and claim 37 should be allowed. Claims 2-5, 8-19, 38-44, and 46-63, depend directly or indirectly from claim 37 and should also be allowed.

The Examiner rejected claim 30 under 35 U.S.C. 103(a) as being unpatentable over H.K. Park et al., as applied to claim 29, and in view of Engelsberg et al., (US Patent 5,800,625). The Examiner also rejected claims 8-11 and 13 under 35 U.S.C. 103(a) as being unpatentable over Elliott et al., as applied to claims 37 and 12 and in view of Ouderkirk et al., (US Patent 5,061,604). Claims 52-56 were rejected as being unpatentable over Elliott et al., as applied to claim 43 and in view of H.K. Park et al.. Claims 44, 45 and 57-59 were rejected as being unpatentable over Elliott et al., as applied to claim 43 and in view of Engelsberg et al.. Claim 47 is rejected as being unpatentable over Elliott et al., and Engelsberg et al., as applied to claim 46 and in view of Engelsberg et al.. Claims 8-11, 13, 52-56, 44, 45, 47 and 57-59 depend directly or indirectly upon claim 37, and claim 30 depends upon claim 29. Since claims 37, and 29 as amended are patentable and non-obvious over the above mentioned references dependent claims are also patentable and non-obvious over these references taken singularly or in combination with another art.

New independent claim 65 describes a method for removing contaminant particles from a surface of a wafer including the following steps: First transferring the wafer among a plurality of processing stations under computer control in a predetermined sequence starting at an input station and ending at an output station. Next identifying and characterizing contaminant particles on the wafer surface at at least one of the processing stations and creating a record of the contaminant particles data for the wafer at the at least one processing station, The process of identifying and characterizing of the contaminant particles on the wafer is performed by an advanced patterned wafer inspection system with an automatic defect classification program. Next transferring the contaminant particles data to a wafer cleaning station followed by transferring the wafer to the wafer cleaning station. Next performing cleaning of the wafer, wherein the wafer cleaning station is adapted to selectively shine light at the contaminant particles based on the contaminant particles data. Finally, transferring of cleaned wafer to an output station.

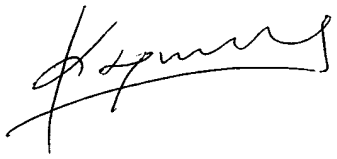
It is believed that the claims as amended and the new claims define an invention, which is unobvious over the referenced prior art patents and document taken singularly or in combination with another art.

In view of the above, it is submitted that all claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance of amended claims 2-5, 8-15, 16, 17, 18, 19, 29-32, 37-44, 46-63 and new claims 65-71 at an early date is solicited.

One new independent and six new dependent claims have been added, whereas one independent claim and 15 dependent claims were previously canceled. Therefore, it is not believed that an additional claims fee for the newly added claims is required.

If this response is found to be incomplete, or if a telephone conference would otherwise be helpful, please call the undersigned at 617-558-5389

Respectfully submitted,



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